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ABSTRACT

This paper attempts to draw applications from major learning taxonomies and theories Bloom's taxonomy of educational objectives and Gagne's types of learning are considered in terms of their implications as diagnostic and evaluation criteria. Additionally, an attempt is made to operationalize these criteria behaviorally. Instructional strategies are drawn from Skinner's approach to operant learning, Banduara's psychological modeling, Bruner's approach to discovery learning, and Ausubel's conception of meaningful reception learning. These positions are viewed as complementary and integratable approaches to communication instruction. (Author/RB)

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THE APPLICATION OF LEARNING THEORIES TO COMMUNICATION INSTRUCTION

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Abstract

This paper attempts to draw applications from major learning taxonomies and theories. Bloom's taxonomy of educational objectives and Gagné's types of learning are considered in terms of their implications as diagnostic and evaluation criteria. Additionally, an attempt is made to operationalize these criteria behaviorally. Instructional strategies are drawn from Skinner's approach to operant learning, Bandura's psychological modeling, Bruner's approach to discovery learning, and Ausubel's conception of meaningful reception learning. These positions are viewed as complementary and integratable not as approaches from which to choose.

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THE APPLICATION OF LEARNING THEORIES TO INSTRUCTION IN A SMALL GROUP COMMUNICATION COURSE

This paper attempts to summarize and synthesize major learning typologies, theories, and strategies that have direct applications for communication instruction. Because there are so many approaches to learning, this writer decided to focus only on those which dominate the field theoretically, empirically, and -- most significantly -- practically. Learning typologies are discussed in terms of objective taxonomies and types of learning. The theories and strategies examined are based on operant, modeling, discovery, and reception learning approaches. Additionally, attempts are made to apply instructional strategies, based on these approaches, to a small group communication course for undergraduate students.

Learning Typologies

Several methods have been developed for classifying types of learning. Some educators have classified learning types according to educational objectives (Bloom, 1956; Krathwohl, Bloom, & Masia, 1964), while others have categorized learning types on the basis of the conditions necessary for each to occur (Gagne, 1965). This section examines two of these typologies as they apply to the types of learning which occur in a small group communication course.

Taxonomy of Cognitive Objectives

Bloom and numerous educators and psychologists contributed to the development of a taxonomy of educational objectives. Three domains were considered: cognitive, affective, and psychomotor. Although there are probably a few affective goals associated with the course (i.e., positive attitudes toward the

course content, communication studies, and the instructor), the objectives are primarily cognitive. Therefore, this section is limited to an examination of cognitive objectives.

Bloom (1956) describes six types of cognitive objectives: knowledge, comprehension, application, analysis, synthesis, and evaluation. Vargas (1972) explains how to develop these objectives behaviorally. Each type is explained below with examples of behavioral objectives relevant to a small group communication course.

(1) Knowledge -- an objective which requires the learner to recall or recognize terminology, facts, conventions, trends, classifications, criteria, methodology, principles, theories, etc.

(1a) The student should be able to list at least six characteristics of a small group as discussed in the text and/or in class.

(1b) The student should be able to match the name of a leadership theory with its primary characteristic as presented in class.

(2) Comprehension -- an objective which requires the learner to translate, interpret, or extrapolate a definition, description, theory, etc.

(2a) The student should be able to explain, in his/her own words, the difference between a group and a collection of individuals.

(2b) Given a theory of small group communication, the student should be able to translate it into layman's language.

(3) Application -- an objective which requires the learner to use abstractions (rules, methods, principles, theories, etc.) in specific situations.

(3a) Given a description of a situation, the student should be able to specify at least two explanations which a given leadership theory would make concerning the behavior of group

members.

(3b) While observing a small group, the student should be able to reliably record interactions and noninteractions via use of the PROANA5 instrument.

(4) Analysis -- an objective which requires the learner to break down a communication in terms of its elements, relationships, or organizational principles.

(4a) The student should be able to identify at least two underlying assumptions for a given leadership theory.

(4b) The student should be able to identify the interrelationships suggested by a given theory of small group communication.

(5) Synthesis -- an objective which requires the learner to put elements together in order to produce a communication, plan, or procedure, or to derive abstract relations.

(5a) The student should be able to produce and explain a PROANA5 simulation employing at least six of the characteristics identified by this technique.

(5b) The student should be able to formulate appropriate hypotheses based on a specific small group theory.

(6) Evaluation -- an objective which requires the learner to quantitatively and/or qualitatively make judgments in terms of internal evidence or external criteria.

(6a) The student should be able to write and defend an evaluation of a group using at least five criteria.

(6b) In cooperation with a group, the student should be able to develop a solution to a problem which best meets the criteria preset by the group.

This taxonomy of cognitive objectives when used in conjunction with behavioral objectives (Mager, 1962; Vargas, 1972), has several useful applications for the classroom. First, it provides a useful method for organizing the content of a course. Second, it prescribes the level of learning required of the student. Third, the behavioral objectives suggest ways to measure whether learning occurs. For both students and teachers it provides a clear statement of the expectations for learner behavior.

Types of Learning

Gagné 's (1965) typology concentrates on the conditions that must be met before learning occurs, rather than goal behaviors. He has described eight types of learning, which have been labeled signal learning, stimulus-response learning, chaining, verbal-association learning, multiple discrimination, concept learning, principle learning, and problem solving.

The first type, signal learning (S-R), involves involuntary, diffuse, emotional responses which have been acquired through the establishment of a conditioned response. Although it is unlikely that signal learning is intentionally used to teach objectives in a small group course, there are several facilitating or interfering behaviors which may have been learned in this way. Two of the most notable interfering behaviors are test anxiety and communication apprehension.

Stimulus response learning (Ss → R) "involves making very precise movements of the skeletal muscles in response to very specific stimuli or combinations of stimuli" (p. 35). The response is voluntary, precise, and includes a skeletal muscular act. Such learning generally includes shaping and the process of discrimination. This type of learning is also not common in a small group course. However, this type is useful in overcoming interfering behaviors such as test anxiety or communication apprehension. Systematic desensitization, a

method commonly used to minimize anxieties, requires the learner to relax muscles in response to specific stimuli situations (imagined or real). This technique can be used to help modify interfering behaviors for students enrolled in a small group course.

Chaining (Ss → R Ss → R) refers to the connecting of two or more stimulus-response links. This type of learning requires that each link has been previously developed and that there is contiguity between links. When the conditions specified in the previous statement have been met, the chain usually occurs on a single occasion. Verbal association learning (Ss → r s → r s → R) can be viewed as a specific type of chaining. Because it involves coding connections which are dependent on the learner's prior history, it is treated as a separate type of learning. This type of learning involves the association of words with visual images, other words, etc. In small groups, several verbal associations are taught. For example, students are taught to associate the word "group" with pictures of groups and/or with words such as "club", "committee", "gang", etc.

Multiple discrimination involves differentiation among chains. First, the learner must acquire individual chains or verbal associations which connect a specific stimulus to a specific response. Second, the stimuli must be made as distinctive as possible so that interference is reduced. Memorization is an important factor in multiple discrimination, but most important is the need to reduce interference to assure retention. This type of learning is prevalent in small group courses. Students are required to discriminate among group types, theories of small group communication, types of leadership, etc.

Concept learning essentially involves the processes of generalization and discrimination. The learner must be able to generalize across a variety of stimulus situations which incorporate the conceptual property and discriminate

among a variety of different stimulus situations. This, too, is a common type of learning in small groups. For example, to learn the concept of a "small group" students must learn to generalize across a variety of stimulus situations which incorporate properties such as size, interdependence, face-to-face interaction, and goal orientation. Students must also discriminate small groups from collections of individuals, organizations, etc. on the basis of different stimulus properties.

Principle learning refers to the understanding of the relationship between concepts or the acquisition of a chain of two or more concepts. To learn a principle, the learner must learn the relevant concepts and develop the chain connecting them. An example relevant to small group communication is learning the principle that: "Leaders engage in procedural functions." The student must learn the concepts "leader" and "procedural functions" and then link the two together.

Problem solving, the final type of learning, involves the application of previously learned principles to solve new problems. The learner must be able to identify the goal, recall relevant principles, combine principles into new ones, and solve the problem. One of the primary objectives in small groups is to teach the student to work with other individuals to solve problems. This type of learning is, thus, extremely important in such a course.

Gagné has suggested that these types of learning can be viewed as a hierarchy of learning with each type of learning serving as a prerequisite for those types which follow it. For example, multiple discrimination learning requires that verbal associations or other chains and stimulus-response learning have occurred. Gagné, however, does not include signal learning as a prerequisite due to the lack of evidence supporting its necessity.

Gagné's explication of the eight types of learning suggests differences in

terms of prerequisites, requirements, and goals. These differences have several implications for instruction. A readiness factor may be identified and operationalized in terms of the individual's mastery of prerequisites. Readiness should be diagnosed and, if necessary prior learning has not occurred, instruction should be directed at establishing prerequisites before advancing to the desired learning type. Because it is quite likely that individuals differ on the basis of prerequisites, learners should have the opportunity to have remedial work or individualized instruction. Such strategies would allow the instruction to be adapted to individual differences. When prerequisites are mastered, the learning process is simplified. Various instructional strategies can be employed as long as they enhance the development of the necessary links among variables. Gagné does not prescribe what methods to use. The only way to judge the efficacy of a given strategy is to test its effectiveness in producing the desired behavior. For each learning type there are different goals which can be specified in terms of behavioral objectives. For example, problem-solving requires the use and combination of old principles to solve a problem. Using a combination of Bloom's (1956) cognitive objectives and behavioral objectives (Mager, 1962; Vargas, 1972), an instructor might relate problem-solving learning to application, analysis, synthesis, and/or evaluation objectives. However, knowledge and comprehension objectives could not be used to test problem-solving ability since they do not require that the principle be used.

Both typologies, cognitive objectives, and types of learning, provide a structure to assist the instructor in applying learning theories and strategies. Behavioral cognitive objectives can be used to specify the behaviors required. Gagné's discussion of learning types can provide cues as to how to break down learning steps.

The next section discusses the application of learning theories and strategies. The typologies presented here help identify where such principles

and methods are applicable.

Learning Theories and Strategies

Due to the plethora of theories and strategies developed for learning, this discussion is limited to those which have the most application to an undergraduate class in small group communication. First, developmental approaches were eliminated because of their primary emphasis on younger learners. Second, numerous cognitive and behavioral theories were rejected because little effort has been made to apply them to classroom situations (i.e., Pavlovian classical conditioning, Hullian hypothetico-deductive behavior theory). The theories included have the following characteristics:

(1) Prescriptive instructional principles and/or strategies have either been derived from the theoretical position or are consistent with it.

(2) A substantial amount of research has focused on classroom applications of the theory.

Operant Conditioning and Behavior Modification

Skinner's operant conditioning approach is an elaboration and extension of Thorndike's law of effect. Therefore, Thorndike's contributions are discussed first. The law of effect has been stated as follows:

> When a modifiable connection between a situation and a response is made and is accompanied or followed by a satisfying state of affairs, that connection's strength is increased: When made and accompanied or followed by an annoying state of affairs, its strength is decreased. (Thorndike, 1913, p. 4).

In other words, individuals do what is pleasant and avoid situations which are unpleasant. Thorndike was one of the first theorists and researchers to focus on instructional problems. Snelbecker (1974) has outlined four major contributions which Thorndike has made to the field of education:

(1) He advocated that curriculum design should be based on social utility,

(2) He provided the impetus for using objectives and measurement to make education a science,

(3) He began the use of educational settings for research, and

(4) He and his followers have recommended that educators establish bonds between a situation and desired behavior by breaking complex acts into simpler ones and systematically rewarding practice.

Thorndike, like Gagné, argued that in order to learn complex behaviors, the learner must first develop the simpler behaviors which are prerequisites.

Skinner's (Ferster and Skinner, 1957; Skinner, 1938, 1953, 1957, 1968, 1969, 1972, 1974) position, although an extension, differs in several fundamental ways from Thorndike's. Rather than limiting the explanation of behavior to satisfying or annoying states of affairs, Skinner discusses positive and negative reinforcers, extinction, and punishment. He does not use an internal condition, such as satisfaction, to explain reinforcement. He simply states that, if a consequence increases the probability of a response, it is reinforcing. Positive reinforcers are defined as rewarding stimuli which follow a response and negative reinforcers are aversive stimuli which the organism is able to escape from or avoid. Extinction is the process of eliminating a response and usually results from providing no consequence for the behavior or from reinforcing an incompatible response. Punishment refers to the application of aversive stimuli following a response. Skinner contends that punishment is ineffective, unless used continuously, and, generally, produces undesirable side effects. He advocates positive, rather than aversive forms of control.

Several other characteristics of the operant approach should be noted. First, Skinner proposes a three-term contingency model (discriminative stimuli, behavior, consequences) which suggests that, in learning, an individual should be exposed to discriminative stimuli which maximize the probability that a

behavior will be emitted and that when the behavior occurs it should be reinforced in order to increase the probability of its occurrence. Second, Skinner advocates the use of functional analysis of situations for the identification of appropriate behaviors and reinforcers. Third, Skinner recommends the use of successive approximations and shaping. Successive approximation involves breaking down a goal behavior into small steps which are to be mastered one at a time. For example, the learner may identify before producing, work from easy to fine discriminations, learn parts before wholes, etc. Shaping refers to the process of reinforcing mastery of each step. An essential feature of this procedure is that the reinforcer should be positive and immediate. This technique is similar to Thorndike's suggestion of breaking down complex acts and systematically rewarding practice. Fourth, Skinner argues that generalization and discrimination are both essential for concept formation. Generalization refers to making similar responses to similar stimuli and discrimination involves making dissimilar responses to different stimuli. For example, to learn the concept "group" the learner must generalize from formal groups (i.e., clubs, committees) to informal groups (i.e., friendship cliques, families) and discriminate between groups and nongroups (i.e., audiences, organizations).

Bijou (1970) reports an educational programming strategy based on the operant approach. This outline provides a useful guide for organizing all educational objectives in a manner consistent with operant theory and research:

(1) state in objective terms the desired terminal or goal behavior,

(2) assess the child's behavioral repertory relevant to the task,

(3) arrange in sequence the stimulus material or behavioral criteria for reinforcement,

(4) start the child on that unit in the sequence to which he can respond correctly about 90 percent of the time,

(5) manage the contingencies of reinforcement with the aid of teaching machines and other devices to strengthen successive approximations

to the terminal behavior and to build conditioned reinforcers that are intrinsic to the task, and

(6) keep records of the child's responses as a basis for modifying the materials and teaching procedures.

(p. 404).

This educational programming procedure is consistent with that attempted in Educational Psychology 105 and 260. It would also provide a useful guide for designing a small group communication course.

In order to minimize aversive control and make learning intrinsically reinforcing, Skinner has also advocated the use of teaching machines and programmed instruction. Teaching machines and programmed instruction present instructional materials in small steps (using successive approximation principles), require students to actively respond to the material, and provide feedback concerning the correctness of the responses. Programmed instruction refers to the general technique and teaching machines are technological devices used in applying the strategy. The steps must be small enough that the learner masters each step before progressing to the next. Correct responses must be immediately and positively reinforced. The learner must play an active role and be allowed to move at his/her own pace. Many programmed instruction materials use branching procedures which allow the student to enter different tracks based on his/her initial performance on a step. This strategy would be useful for teaching content (concepts, principles, theories, etc.) in small group courses, but would have limited utility in shaping behaviors (i.e., leadership).

Strategies designed for shaping behaviors include contingency management, token economies, contingency contracting, and precision teaching (Homme & Tosti, 1971a, 1971b; MacMillan, 1973; Snelbecker, 1974). Most of these strategies were developed for special education students or psychiatric patients, but can be adapted to certain behaviors for college small group students. In general, these strategies involve the following steps:

(1) Specify the behavior.

(2) Record the rate at which the behavior occurs.

(3) Give small, frequent, immediate reinforcers following the occurrence of the desired behavior.

Specific strategies involve some variations, but the basic procedure includes these three steps. These procedures can be applied to a small group course to increase member interactions in groups or to shape particular behaviors in groups.

In summary, the operant approach emphasizes the use of positive control in the classroom and specifies procedures for achieving objectives. Operant theorists and researchers have produced numerous instructional strategies which can be applied to almost every aspect of instruction. Bijou's educational programming outline can serve as a guide for designing the entire curriculum. Programmed instruction techniques can be used to teach content and behavior modification strategies can be applied to the development of specific behaviors. I would argue that the operant position provides the best philosophical, scientific, and practical approach for the design and execution of instructional strategies. The most useful applications from the theories discussed in the following section can also be used within an operant framework.

Psychological Modeling

Although Bandura (1965, 1969, 1971) supports the operant approach, he argues that the Skinnerian group has operated from a restrictive paradigm. First, he contends that learning and performance can be distinguished and that no trial learning can occur. He argues that the acquisition or learning of a matching response occurs through contiguous association of sensory events and that performance may depend on reinforcements administered to the model or anticipated by the learner.

Second, Bandura notes that operant conditioning is effective for shaping and maintaining behaviors when the essential responses are part of the behavioral repertoire of the organism. However, for developing new behavioral repertoires or unique complex combinations of responses or for cases in which there are no reliable discriminative stimuli, operant conditioning is likely to be extremely time consuming and inefficient. Modeling is recommended as a strategy for learning new behavioral repertoires. Modeling requires a skilled model demonstrating the behavior, a pictorial representation of the behavior, or a verbal description of the behavior. The learner is a passive participant but must perceive the stimuli in order to learn.

Modeling serves three primary functions. First, learners may acquire new behaviors by observing others. Second, modeling may strengthen or weaken inhibition. Increased inhibition is often produced via observation of a model who receives punishing consequences and disinhibition generally occurs as a result of observing a model perform a threatening behavior without receiving aversive consequences. A third function is response facilitation. The response is commonly one which is socially accepted and part of the learner's repertoire, but is prompted by the behavior of others.

Essentially, there are four subprocesses involved in modeling: attention, retention, motor reproduction, and motivation. Bandura (1971) argues that, when a learner is confronted with a modeling stimulus, he must first attend. Characteristics of the model and of the observer affect attention. Modeling stimuli which are effective in getting attention are characterized by: distinctiveness, affective valence, complexity, prevalence, and functional value. The observer characteristics which affect attention are: sensory capacities, arousal level, motivation, perceptual set, and past reinforcement. Second, the retention process requires the observer to symbolically code, cognitively organize, symbolically rehearse, and engage in motor rehearsal of the behavior observed.

Third, the motor reproduction process is dependent on the observer's physical capabilities, the availability of component responses, self-observations of the modeled behavior, and the accuracy of feedback. Finally, motivation is affected by external, vicarious, and self reinforcement. The modeling process might be diagrammed as follows:

MOTIVATION → ATTENTION → STIMULUS → RETENTION → RESPONSE

This approach to learning differs from an operant perspective by the inclusion of such cognitive constructs as motivation, attention, and retention and by the exclusion of reinforcement following the response. Reinforcement, however, is included in the motivational and attention processes and, thus, by implication, is an important part of the modeling process, although it is not the primary determinant of the behavior.

Vicarious reinforcement has been extensively researched by social learning theorists. Bandura (1971) concludes that vicarious reinforcement may produce the following effects:

(1) It informs the learner about behaviors that are likely to meet with approval or disapproval.

(2) It may enable the learner to discriminate between situations in which a behavior is acceptable or unacceptable.

(3) It may provide an incentive for the observer to behave in the prescribed manner due to the anticipation of reinforcement.

(4) It may extinguish or elicit emotional arousal in the learner.

(5) It may modify the observer's perception of the model's status.

(6) It may modify the learner's perception of the reinforcing agents.

The consequences received by the model may affect the observer in any of these ways. Therefore, vicarious reinforcement is an extremely important aspect of the modeling process.

Another variable which should be considered is the model's status. Model characteristics seem to be most important when the behavioral consequences are unknown. If the model's status is high, the observer may engage in the prescribed behavior. However, if the consequences are undesirable, the behavior will be extinguished and the model's future influence will be diminished.

The modeling process is almost unavoidable in instruction. In a small group communication course its applications are varied. For example, students may be required to do computer simulations of small group interaction. They must learn to code, keypunch, and interpret data. In order to learn to code data, they are given written instructions to follow and examples to model. To learn to keypunch, students observe via videotape a frustrated model who receives oral instructions and learns to keypunch successfully. The students then model the behavior by keypunching their own data and are reinforced when they correctly perform the behavior. They may then be given written examples of how to interpret the data. By modeling such examples, they should be able to successfully interpret their own data. Modeling procedures can also be used to teach students the behaviors associated with effective participation in small groups. Models may be in the form of instructions, examples, videotape demonstrations, role playing, etc.

In addition to providing the modeling stimuli, it is important for the instructor to consider factors related to motivation, attention, and retention. It is also necessary to provide consequences which will serve to facilitate or inhibit the future occurrence of the behavior.

Discovery Learning

Bruner (Bruner, 1966; Shulman, 1968; Anglin, 1973; Snelbecker, 1974) takes a more cognitive approach to instruction. His perspective is based on several assumptions about the educational process. First, he characterizes

institutional learning as intellectual growth (Bruner, 1966). He describes growth in the following ways:

1. Growth is characterized by increasing independence of response from the immediate nature of the stimulus...

2. Growth depends upon internalizing events into a "storage" system that corresponds to the environment...

3. Intellectual growth involves an increasing capacity to say to oneself and others, by means of words or symbols, what one has done or what one will do...

4. Intellectual development depends upon a systematic and contingent interaction between a tutor and a learner...

5. Teaching is vastly facilitated by the medium of language, which ends by being not only the medium for exchange but the instrument that the learner can then use himself in bringing order into the environment...

6. Intellectual development is marked by increasing capacity to deal with several alternatives simultaneously, to tend to several sequences during the same period of time, and to allocate time and attention in a manner appropriate to these multiple demands (Bruner, 1966, pp. 5-6).

The emphasis is placed on improving information processing capabilities, decreasing the importance of specific stimuli and extrinsic reinforcers, and increasing internalization and intrinsic reinforcement.

A second assumption is that, in learning, it is important to consider how knowledge is structured. Shulman (1968) interprets Bruner's spiral curriculum as beginning with the complex and learning the fundamentals or simple components in order to solve the complex.

Third, Bruner argues that the concept of readiness has been misused. It is his contention that readiness is taught and that learning consists of mastering simple skills in order to achieve complex skills. Bruner suggests that learning involves three almost simultaneous processes: acquiring new information, transformation or manipulating information, and evaluation or

determining the adequacy of the transformation for a given task (Anglin, 1973).

A fourth assumption is that intuition plays a valuable role in education. He argues that instruction should be designed to develop intuitive thinking. Essentially, he is referring to the context of discovery as philosophers of science conceptualize it. Learners should be encouraged to develop tentative formulations or educated guesses which can later be put to test. He also suggests that educators should avoid the notion that every question has one right answer. In essence he argues that learners need to know the scientific method.

Finally, Bruner assumes that motivation is essential for learning to occur. He acknowledges that extrinsic reinforcers are sometimes useful in initiating or sustaining learning, but that the ideal motivation exists when reinforcement comes from learning per se. He suggests (Bruner, 1966) that intrinsic motivation comes from a natural curiosity, a drive to achieve competence, and reciprocity or the drive to respond and work with other human beings. Activities which allow a learner to actively participate and experience competence in dealing with the world are ones which will motivate the student to learn. It should be noted that this interpretation of motivation is really not that different from that of Skinner and Bandura. All of these theorists argue that motivation or reinforcement should move from extrinsic to intrinsic factors. The main distinction among the approaches is that Bruner attributes motivation to drive states or cognitive elements and Skinner and Bandura attribute it to reinforcers or behavioral elements.

Based on these assumptions, Bruner has identified four basic features for a prescriptive theory of instruction (Bruner, 1966). The first feature is that such a theory must specify strategies for developing a favorable predisposition toward learning or, more specifically, toward exploring alternatives.

Bruner prescribes three conditions for developing predispositions: activation, maintenance, and direction. Activation involves curiosity, which he contends is a response to optimal uncertainty. Learning tasks must provoke exploration. Maintenance occurs when the benefits exceed the risks of exploration. Bruner contends that the consequences of error behaviors should not be too aversive. Direction depends on understanding the task goal and the relevance of alternatives for achieving that goal. Students must be made aware of the results of their explorations.

The second feature of a prescriptive theory is that it must specify how knowledge is to be structured. Bruner identifies three characteristics of such a structure: the mode of representation, its economy, and its power. Knowledge can be represented in terms of actions required for achieving a goal (concrete or enactive), images or graphics that broadly stand for a concept (visual or auditory or iconic), and symbolical or logical propositions (words or numbers or symbolic). Developmentally, people learn to deal with a concept or problem, first, on a concrete level; then, graphically; and, finally, symbolically. Therefore, educators must consider the entry level of the learner. Economy refers to a learner's information processing ability and varies with the mode of representation (e.g., it is easier to handle symbols than concrete operations). Economy also depends on the sequence by which material is learned; for example, fewer information processing operations are needed when material is presented in a problem solution format. Finally, power depends on the learners ability to generate new propositions and solve problems based upon the information acquired. Educators should continuously examine the effects of various learning tasks in terms of power.

The third element of an instructional theory is that it should specify the sequence by which materials should be presented. Such sequences depend on

the educational objectives, but should be adapted to the learner's entry level and enhance his or her ability to transform and transfer what is being learned. Additionally, the instructor should consider the developmental progression from concrete to symbolic operations and motivational factors when designing the sequential presentation of material.

The final feature involves the form and pacing of reinforcement. Bruner recommends that reinforcement be used for informative functions; that is, educators should provide feedback which lets the student know when he or she is making progress or which provides the student with economical information that will encourage self-correction. Again, reinforcement should be primarily intrinsic.

The most significant application of Bruner's approach is the strategy which he has labeled discovery learning. It involves minimal teacher guidance and maximal student exploration and trial and error learning. The emphasis is on the learning process rather than outcomes. He contends that such a strategy can produce maximal transfer from one learning situation to another because the emphasis is on broad principles rather than the specifics of the task. If properly designed, discovery tasks should also produce a shift from extrinsic to intrinsic reinforcement. He also argues that discovery learning improves the information retrieval process by allowing the learner to organize material in terms of his or her own cognitive structure. The learner is an active participant in information processing, selects and transforms information, and constructs and tests hypotheses. Discovery learning can be conceived of as either a method or goal of instruction.

As a method, discovery can be used in small group communication courses to help students understand the relationships among small group variables. Students can engage in mini-studies to investigate such relationships and discover for themselves how variables operate. General areas for study and possible

alternatives for approaching a problem can be suggested by the instructor and/or generated by the students. The educator should avoid providing too much structure to such tasks. Evaluation procedures should be designed to reinforce the process rather than the outcome; for example, mini-studies could be evaluated in terms of the justification and criticisms of the selected alternatives rather than the result.

As an objective or goal of instruction, discovery can be used in a small group course to help students understand agenda-making or the problem-solving process. One of the most common activities in a small group course requires students to complete a problem-solving task. If students are required to analyze and employ the attitudes, strategies, and skills of problem-solving and are evaluated in terms of their ability to generate alternatives and evaluate their effectiveness via discovery, such a task should help achieve the goal of learning how to explore and solve problems.

I would suggest that discovery learning can be incorporated in a course which is designed primarily from an operant perspective. Behavioral objectives and mastery of the discovery process can be used in conjunction with each other. Discovery methods can also help bring behaviors under the control of intrinsic reinforcers.

Meaningful Reception Learning

Ausubel is a cognitive theorist who has studied receptive and meaningful verbal learning (Ausubel, 1963, 1963b, 1968; Snelbecker, 1974). He agrees with Bruner's emphasis on cognitive processing, but disagrees on the importance of discovery learning. Although he recognizes that discovery methods may be useful, he argues that they may be too inefficient in many situations. Instead, he argues that new learning and retention can be facilitated by what he calls meaningful reception learning. Essentially, this approach relies on extrinsic organizing devices which can be used to alter a learner's cognitive structure

and, thus, facilitate positive transfer and reduce proactive inhibition.

In order to understand the concept of meaningful reception learning, it is important to distinguish it from rote learning. Ausubel (1963a) makes two basic distinctions:

(1) Meaningful learning occurs when new materials are related to the learner's existing cognitive structure or prior experiences in such a way that the learner can understand relationships among concepts. Rote learning involves memorizing discrete and isolated items that cannot be meaningfully related to the existing cognitive structure.

(2) Because meaningfully learned material is anchored to the ideational system, it is also less vulnerable to forgetting than rote learning which has no anchor.

Meaningful learning is nonarbitrary and relatable to relevant concepts in the particular cognitive structure of the particular learner and, therefore, is less subject to forgetting.

Ausubel (1963b) posits a model of cognitive organization based on the subsumption process. The model assumes the existence of a hierarchically organized cognitive structure which consists of highly inclusive conceptual traces and less inclusive subconceptual traces plus specific information. New information is processed by subsumption under existing categories or reorganization of the individual's cognitive structure (these processes are similar to Piaget's assimilation and accommodation concepts).

Two basic principles are related to effective subsumption. The progressive differentiation principle states that:

> ...new ideas and information can be efficiently learned and retained only to the extent that more inclusive and appropriately relevant concepts are already available in cognitive structure

> to serve a subsuming role or to furnish ideational anchorage (Ausubel, 1963b, p. 79).

The learner must have a category into which the new information can be subsumed. The principle of integrative reconciliation suggests that, in order to learn new information or understand overlapping concepts, the learner should be made "explicitly to explore relationships between these ideas, to point out significant similarities and differences, and to reconcile real or apparent inconsistencies" (Ausubel, 1968, p. 155).

In terms of specific instructional applications, Ausubel recommends the use of advance organizers. Advance organizers are abstract and inclusive introductory statements which can serve as anchors for new information to be learned. Such statements are overviews which help organize or structure the particular content. In keeping with the principle of progressive differentiation the material might be presented in descending order of inclusiveness. For integrative reconciliation, the similarities and differences between ideas to be learned and existing concepts in the cognitive structure should be presented. Material should be presented following a sequential organizational pattern and each step should be mastered before going on to the next one.

Ausubel's model is most applicable to the oral or written presentation of information. Texts, programmed instruction, project assignments, lectures, etc. can be improved by applying advanced organizers and considering the principles underlying the subsumption process. For example, when teaching such concepts as "group", "conformity", "attitude", etc., it is important for a small group instructor to analyze how these concepts are cognitively structured for most human beings. The layperson's interpretation of such concepts is generally not as specific as that of a communication scholar. Therefore, the instructor must be concerned with providing an organizational hierarchy and reconciling apparent inconsistencies within the student's cognitive structure. Instructional

materials should be prepared and/or selected on the basis of the following criteria:

(1) The materials include an overview which provides anchors for the material which follows.

(2) The materials are sequentially organized.

(3) Materials attempt to reconcile apparent inconsistencies rather than treat overlapping topics in a self-contained fashion.

In spite of Ausubel's objections to behavioral approaches, the applications cited above could be used in a course designed primarily from an operant perspecitive.

Summary

The learning typologies, theories, and strategies discussed in this paper are certainly not presented as being exhaustive of all the approaches to learning. They are, however, representative of approaches that have implications for instruction. Further, this author contends that the applications cited can be used together.

The distinctions among these approaches do not necessitate choosing among them for one instructional strategy. They can all be incorporated to improve instruction. Bloom discusses cognitive, affective, and psychomotor objectives which, Vargas and Mager have illustrated, can be made behavioral. Gagné identifies a set of hierarchical prerequisites for learning which, when carefully applied, could be used to determine readiness and/or help sequentially organize materials consistent with the beliefs about cognitive structuring offered by Bruner and Ausubel. Further, such prerequisites can help identify steps for programmed instruction or behavior modification. Skinner discusses using positive control in the classroom and employing programmed instruction and behavior modification for teaching content and shaping behaviors. Bijou's

educational programming outline and Skinner's recommendations can be used for the underlying principles guiding the design of a course and specific strategies can be used when appropriate. Bandura's modeling techniques can be used to develop new behaviors or complex combinations of responses. Bruner's discovery learning can be used to teach people how to learn and to find learning intrinsically rewarding. Ausubel's reception learning can be used to guide selection and preparation of materials and to expedite teaching simple concepts.

There are two major distinctions among the approaches. The first concerns the locus of control for learning. For Skinner, the consequences determine behavior. For Bandura, learning is determined by the contiguous association of sensory events and is dependent on attention, retention, motor reproduction, and motivation processes. For Bruner and Ausubel the determinants are basically internal drive states or cognitive structuring capabilities. The second basic distinction involves the type of learning. Skinner and Bandura are primarily concerned with observable behavior (although Bandura would label behavior as performance and the prior contiguous association as learning). Bruner emphasizes discovery as both a method and objective of education. Finally, Ausubel focuses on reception learning. Both Bruner and Ausubel view learning as an internal unobservable state which may or may not be evident by behavior. Regardless of how learning is interpreted or what the focus of learning is, people involved with instruction can apply all of these techniques for appropriate learning objectives.

REFERENCES

Anglin, J. M. (Ed.). Jerome S. Bruner: Beyond the information given. New York: W. W. Norton, 1973.

Ausubel, D. P. Cognitive structure and the facilitation of meaningful verbal learning. Journal of Teacher Education, 1963a, 14, 217-230.

Ausubel, D. P. The psychology of meaningful verbal learning. New York: Greene and Stratton, 1963b.

Ausubel, D. P. Educational psychology: A cognitive view. New York: Holt, Rinehart, & Winston, 1968.

Bandura, A. Behavioral modifications through modeling procedures. In L. Knasner & L. P. Ullman (Eds.), Research in behavior modification. New York: Holt, Rinehart, & Winston, 1965.

Bandura, A. Principles of behavior modification. New York: Holt, Rinehart, & Winston, 1969.

Bandura, A. Psychological modeling: Conflicting theories. Chicago: Aldine. Atherton, 1971.

Bijou, S. W. What psychology has to offer education now. In P. B. Dews (Ed.), Festschrift for B. F. Skinner. New York: Appleton Century Crofts, 1970, pp. 401-407.

Bloom, B. S. (Ed.). Taxonomy of educational objectives (Handbook I: Cognitive Domain). New York: David McKay, 1956.

Bruner, J. S. Toward a theory of instruction. New York: W. W. Norton, 1966.

Ferster, C. B. & Skinner, B. F. Schedules of reinforcement. New York: Appleton Century Crofts, 1957.

Gagne, R. M. The conditions of learning. New York: Holt, Rinehart, & Winston, 1965.

Homme, L. & Tosti, D. Behavior technology: Motivation and contingency management (Units one and two). San Rafael: Individual Learning Systems, 1971a.

Homme, L. & Tosti, D. Behavior technology: Motivation and contingency management (Units three and four). San Rafael: Individual Learning Systems, 1971b.

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. Taxonomy of educational objectives (Handbook II: Affective Domain). New York: David McKay, 1964.

MacMillan, D. Behavior modification in education. New York: MacMillan, 1973.

Mager, R. F. Preparing instructional objectives. Belmont, CA: Lear Siegler, 1962.

Shulman, L. S. Psychological controversies in the teaching of science and mathematics. Science Teacher, 1968, 35, 34-38, 89-90.

Skinner, B. F. The behavior of organisms. New York: Appleton Century Crofts, 1938.

Skinner, B. F. Science and human behavior. New York: Free Press, 1953.

Skinner, B. F. Verbal behavior. Englewood Cliffs: Prentice Hall, 1957.

Skinner, B. F. The technology of teaching. New York: Appleton Century Crofts, 1968.

Skinner, B. F. Contingencies of reinforcement: A theoretical analysis. New York: Appleton Century Crofts, 1969.

Skinner, B. F. Cumulative record: A selection of papers. New York: Appleton Century Crofts, 1972.

Skinner, B. F. About behaviorism. New York: Knopf, 1974.

Snelbecker, G. E. Learning theory, instructional theory, and psycho-educational design. New York: McGraw-Hill, 1974.

Thorndike, E. L. Educational psychology. Vol. 2. The psychology of learning. New York: Teachers College, Columbia University, 1913.

Vargas, J. S. Writing worthwhile behavioral objectives. New York: Harper & Row, 1972.